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AUTHOR Bohle, Robert H.; Garcia, Mario R.
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ABSTRACT

In order to discover reader reactions to color on a newspaper page, specifically eye movement and overall opinion of the paper, identical pages were created and printed by the "St. Petersburg Times" (Florida). The content of fifteen front pages, six lifestyles pages, and three sports front pages were nearly identical, differing only in the kind and amount of color used. These were presented to 83 representative readers from three cities: Richmond, Virginia; Fresno, California; and St. Petersburg, Florida. Subjects' verbal responses to questions about where their eyes first fell and where they fell next were coded by trained interviewers. To test opinions, the subjects rated the pages on 20 word-pair scales, which were divided into five general factors: evaluative, ethical, stylistic, potency, and activity. In another test of opinions, the readers were presented with the five pages in all possible pairs (10) and asked to select one page over the other on a word of interest, such as "important" (e.g., one of the pages would be "more important"). Color clearly made a difference in eye movement, and even though the main photo on all the pages drew the most attention, color reduced its power. The use of color does not seem to lower opinion about the ethical nature of the newspaper, and readers did not make assumptions about believability or importance based on the appearance of the paper alone. But because color does make a paper appear more interesting, pleasant, exciting, and powerful, a publisher might do well to use color, providing that the quality is good. A literature review of the psychological effects of color is included. (SRT)

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Reader reactions to color in newspapers

Robert H. Bohle

and

Mario R. Garcia

Submitted to the Visual Communications Division

Association for Education in Journalism and Mass Communications

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Reader reactions to color in newspaper design

Newspapers everywhere are using color. Between 1979 and 1983, the number of newspapers using color more than doubled (12 percent to 28 percent).[1] Fifty-three percent of all weekday papers had color in 1983. In a survey of papers with circulation under 75,000, 66 percent used color regularly and another 18 percent used it occasionally.[2]

Color is clearly becoming more of a daily design element in newspapers, but unfortunately, much color use by newspaper designers is uninformed and an "aimless vagrant on the page," according to design consultant Dr. Mario R. Garcia.[3]

But, despite this increased use of color, little research has been done to find out whether indeed readers like all the color and how it affects their eye movements through a page, an important aspect of newspaper design.

This study, funded by The Poynter Institute for Media Studies in St. Petersburg, attempts to address both these important aspects of color and newspapers.

REVIEW OF THE LITERATURE

Much of the research done previously has centered on non-newspaper issues. Advertisers, naturally, are very interested in whether the extra money spent for color brings improved results. Most non-advertising/marketing studies have to do with the psychological/physiological effects of color. Because color, even color in newspapers, does affect the viewer, a brief summary of this research is included as well.

In one newspaper study, Click and Stempel tested the effects of color halftones vs. black-and-white halftones on reader opinions.[4] Using similar newspapers that differed largely in their use of photos, they discovered that readers heavily preferred color.

The only research found that had anything to do with newspaper spot color was one done on the background color on a tabloid insert aimed at architects.[5] Red had a much higher attraction rating than any other

color. The other colors tested--yellow, brown, red, and green--were rated nearly the same. Bright yellow scored better than muted yellow, but muted green was better than bright green. No difference was found in the reds and blues.

In Ruth Clark's study, Relating to Readers in the '80s, readers were asked to respond to the following statement: "I wish newspapers would use more color and color pictures." Surprisingly, only 46 percent agreed, although the figures were higher for the 18-to-24 age group (52 percent), minorities (52 percent), and non-readers (61 percent).

On the other hand, another study found that 65 percent of the subjects surveyed wanted more color pictures, and the young liked color more than did older readers.[6]

A 1985 INAME survey found that readers see newspapers with ROP color as "progressive."[7] The study also found that readers found color photos more realistic than black and white, that readers dislike poor color reproduction, and that the use of color may boost readership.

Advertising Tests. Much of the media color research has been done by advertisers or groups interested in advertising. Because readers perceive color the same way whether it is in an ad or in editorial content, we can learn much from these studies.

In ads, color generally pulls more reader attention. Also, the more color surrounding an element, the less attractive power that element has. Among other results:

--on 9 of 11 color vs. black and white ad pairs, the color version was remembered better. Color ads with lots of color surrounding them were weaker against black and white.[8]

--color is more important in gaining attention than is illustration.[9]

--in a study of color and store design, red tended to attract the most attention, but its active nature made people more tense than did the other colors.[10]

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--in an NAB study, body type in a color ad was read by 80 percent of subjects; in a black-and-white ad, only 50 percent.[11]

--in another test--this one testing recall, not attention--color was recalled more frequently, but black and white beat color in depth of recall.[12]

--color scored well in a recognition test for ads, but black and white did better in an aided recall test.[13]

--in a study of a long-term ad campaign, black-and-white did better on recall than did color.[14]

--two-color ads increase readership by 20 percent, but have no advantage over black and white in attention-getting power.[15]

It appears, then, that color is better for the fast grab, for the quick appeal, but that black and white is better for a response needing more in-depth thinking.

Manufacturers also are interested in the effects of the product they are trying to sell. Black, red, purple and blue are seen as "heavy" colors; yellow, orange, white and pastels as "light" colors.[16] Thus, a vacuum cleaner should never be red or dark blue because it may be perceived as heavy and difficult to work with.

Psychology and physiology. The eye is capable of seeing several million colors. But we have names for very few of these colors. In fact, the basic color vocabulary is only about a dozen words. Other words for colors are (1) qualifiers [light or dark], (2) or the name of something else [gold or lemon or puce, which comes from the Latin word for flea, pulex--yes, a flea's belly is colored puce], (3) or the putting together of two colors [blue-green, red-orange], or (4) just pulling a name out of a hat [magenta, a dye created in 1859, was named after the Battle of Magenta in Northern Italy].[17]

Color itself conveys meaning. Red, in almost any culture, in almost any period of man's development, has meant danger. It was found to be the third

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color word added to a culture's vocabulary (after black and white) in nearly all of 2,000 cultures studied.[18] In the West, black is the color of mourning and funerals; in China, white is used for mourning.

So, to a certain extent, color is cultural. Eskimos, for instance, have no word for brown in their vocabulary, but they have many words for different shades of white. A number of studies have shown that reactions to certain colors--red, for instance--are similar. Red, an active color, actually excites brain waves. Thus, regardless of cultural background, someone seeing the color red has certain physiological reactions.[19]

Red has been found in several studies to raise the respiration rate, blood pressure, the number of eye blinks per minute, and the amount of hand tremors. Blue, on the other hand, lowers all three.[20]

Time spent before a red screen was estimated as shorter than the same amount of time spent before a blue screen in one interesting test.[21] Thus, red, the "active" color, perhaps made the subject feel "busier," so time went faster. Blue, the "passive" color calmed the subjects so much, time seemed to lag.

Another study found that the warm colors have a strong excitation effect and may cause people problems in concentrating on a task.[22] Yet another test found reaction times 12 percent higher than normal under a red light. A green light actually slowed responses.[23]

Red has been found to be more arousing than green, but violet was found as more arousing than green as well. It may be that the ends of the spectrum (red and violet) are more arousing than the center. In other words, in terms of arousal red > orange > yellow > green < blue < indigo < violet. [24]

Several researchers have tried to attach personality attributes to color preferences, or vice versa. Faber Birren, a leading authority on color and the author of many books on the subject, said that red is preferred by active people, orange by friendly, yellow by the high-minded, and blue-green by fastidious.[25]

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Birren also noted that blue is the most-cited favorite color, with red second. In fact, the ends of the color spectrum, where apparently more arousal strength exists, seemed to be preferred in general over the middle (green).

He found that Latins tended to prefer reds and oranges, Scandinavian people blues and greens, and that red is better for emotionally determined actions, while green is better when the goal is exact fulfillment of a task.[26]

Many color psychologists believe that people are either warm-color dominant or cool-color dominant and that these general color preferences are tied to many other personality traits.

E.R. Jaensch says that with warm colors goes the primitive response of children, excitation, extraversion. Warm colors tend to be preferred by brunets, he says. On the other hand, cool colors, preferred by blonds, go with more mature responses and introversion.[27]

Other psychological associations commonly attached to certain colors:

red: passionate, exciting, rage, fierceness, intensity.
orange: jovial, energetic, hilarity, exuberance, forceful.
yellow: cheerful, inspiring, celestial, high spirit, health.
green: peaceful, refreshing, quieting, ghastliness, terror, guilt.
blue: subduing, melancholy, sober, gloom, furtiveness, fearfulness.
purple: mournful, dignified, mystic, loneliness, desperation.
white: pure, clean, frank, youthful, normality.
black: depression, funereal, negation of spirit, death.[28]

Only younger children have been found to prefer bright, fully saturated colors. Once a child reaches the teen years, and then throughout adulthood, the preference is for pastels.[29] There appears to be little differences between the sexes on color preferences.[30]

Among college students tested in one study, those who preferred warm colors had quicker reaction times and scored higher on a "heterosexuality" scale than did those who preferred cool colors. Also, the warm color

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preferrers rated erotic jokes higher in a joke evaluation test than did cool color preferrers.[31]

Some even claim that certain colors of light will actually heal medical problems.[32] In other words, depending on the illness, a specific color shone on the affected part of the body can cure the problem. Blue, for instance, is supposed to be good for a sore throat.

Birren says that it may be generalized that color affects muscular tension, brain waves activity, heart rate, respiration and other functions of the autonomic nervous system, and that it certainly arouses emotional and esthetic reactions.[33]

Many of the studies referred to have been severely criticized.[34] In fact, it appears that little is known for sure about how people react to color.

Dr. Robert Chestnut, research director of the Ted Bates Agency in New York, has pointed out studies that color preferences change throughout a day for no other apparent reason than the passage of time.[35] So asking readers what color they would prefer on your nameplate may well be a waste of time--unless, of course, you ask everyone their preference at press time.

Summary. Color affects people physiologically and psychologically. Color conveys meaning, aside from the content of whatever it is in color. Color is also an important variable in the design of a page. It has the power to attract, and, based on advertising studies, appears to be more powerful than black and white. The pull at the readers' eyes, however, is lessened if more color surrounds the element of interest.

Readers seem to like color halftones because they are more realistic and the paper as a whole is thought of as more progressive. Still little research focusing specifically on color on a newspaper page has been done. Because of that, this study set out to discover reader reactions to color on two rather straightforward and simple matters: eye movement and overall opinion on the paper.

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METHODOLOGY

To isolate the effect of color, all other variables need to be held constant. One flaw with the few previous studies in this area was that different papers were compared. Thus, any differences may be attributable to any number of content, as well as format, variables.

For this test, identical pages were created and printed by the St. Petersburg Times. Fifteen different versions of a front page, six of a lifestyles page, and three sports fronts were printed. The content of the pages was nearly identical. They differed only in the kind and amount of color used.

(The front pages do differ in one respect: on some pages the "Inside" box in the lower right-hand corner has a one-column, black-and-white mug shot of former Sen. Sam Ervin; on others it is a column wider and carries a larger color halftone of a woman and an animal. Thus relative attraction of the Inside box on pages should not be compared.)

Subjects were selected to approximate as closely as possible the "average" newspaper reader in each community. An extra effort, however, was made to get a sizable number of blacks and elderly readers for demographic analysis. Thus, the overall sample is skewed, and care should be taken when attempting to generalize the results (Table 1).

One-on-one interviews with 83 subjects took place in Richmond, Va., Springfield, Mo., Fresno, Calif., and St. Petersburg, Fla. These sites were selected because they offered a wide variety of demographics in their readers and a variety of color usage by the papers in those cities.

For the eye movement test, a trained interviewer presented each subject with 15 pages, one at a time. After a subject had looked at the page for a few seconds, the interviewer would ask: "On this page, where did your eye first fall?" Then: "Where next?" and "Where after that?"

The interviewer would code the responses according to explicit instructions discussed during training. "Skip" pages, or pages with a non-eye movement question asked, were used to try to avoid straight line responses.

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Readers were told before the tests that content was not necessarily important, and that we were interested in their reactions toward how the page looked.

To test opinions toward the paper, we first used a set of 20 word-pair semantic differentials used by Click and Stempel in their studies.[36] Five front pages ranging from full black and white to very colorful were presented to the readers.[37]

Then, in another test of opinions, the subjects were presented with the five pages in all possible pairs (10) and asked to select one page over the other on a word of interest. For instance, subjects were told to consider "Important" and select one of each of the pairs as being "more important." Five words from the 20 word-pairs were used.

RESULTS

The results of the eye movement test were tabulated two ways. First, simple percentages were calculated for the responses to each of the three questions. The "winner"--the most frequently cited element--for each question is listed in Table 2.

But because a single element often finished first and second on a page, it was difficult to see the relative strengths of the elements.

So a "Visual Magnetism Index" was created for each element on the page (Table 3). Essentially, the "seen firsts" by each subject earned three points, the "seen next" responses two, and the "after that" responses one. The sum of these scores for each element on the page is its index number.

Color clearly made a difference in eye movement, even though the main photo on all the pages drew the most attention, regardless of whether the it was color and whether spot color was used on the page.

On the front pages, after visiting the main photo first, readers usually were attracted to the color on the page--process or spot--even if that movement meant going below the fold. On the black and white page and on the page with only a color nameplate, the first move was, generally, from the photo to the lead story.

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Also, on the pages with no color below the fold, the first three attractors of the readers' eye were all above the fold. In a sense then, color could be seen as keeping the reader from getting right to the news.

On the lifestyle pages, color played an even more interesting part. Despite the obvious strong attraction of photos, a blue tint block over type at the bottom of the page was able to move many eyes right past a three-column by three-inch photo.

The all black-and-white page showed high eye traffic on the two photos. The pages with color, even the page with only spot color, showed the ability of spot color, no matter where it was used, to attract the eye.

The three sports pages followed the same pattern: photos were the big draw on the black and white page. A gray-screen football schedule was <u>not</u> enough to draw the eye below the fold, whereas one in color was.

Finally, the sports flag drew a lot of reader attention. This was not true on either the fronts or the lifestyle pages. Two of the sports flags were in spot blue, but even the flag on the all black and white page received heavy eye traffic: 25 percent of the people stopped there first.

This may be explained by the fact that the main photo on the sports pages--a picture of pro golfer Judy Clark bent over a putt--did not have the attraction of a space shot on page 1 or a bear on the lifestyle pages. Also, the additional white space around the short word "sports" may have added to the attraction.

For the semantic differentials, mean scores for each page on each word-pair were calculated (Table 4). Multiple t-tests for each of the 10 possible pairs were run to check for significant differentials, even though this many t-tests may lead to a significant difference by chance. In fact, there is a 50-50 chance that one pair would show a significant difference strictly by chance.[38]

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For this test, readers were given a page and asked to pay no particular attention to the content and rate it on each of the 20 word pairs scales (a 1-to-7 scale was used). The subjects saw the five pages cited earlier.

The order of the pages and the order of the word pairs were varied at all four test sites.

The 20 word pairs are divided into five general "factors": evaluative (pleasant-unpleasant, valuable-worthless, important-unimportant, interesting-boring), ethical (fair-unfair, truthful-untruthful, accurate-inaccurate, unbiased-biased, responsible-irresponsible), stylistic (exciting-dull, fresh-stale, easy-difficult, neat-messy, colorful-colorless), potency (bold-timid, powerful-weak, loud-soft), and activity (tense-relaxed, active-passive, modern-old fashioned).

The major concern was whether use of color would negatively affect the serious tone of the delivery of important news, i.e., how would color effect ratings of importance or accuracy? It also was predicted that the more colorful pages would score high in the stylistic and activity factors. All 10 possible pairs of the five pages were tested for significant differences on each word pair.

Readers clearly like color (Table 4). More importantly, the use of color does NOT reduce opinions about the ethical nature of the newspaper. There were no statistically significant differences among any possible page pairs on four of the five ethical factors. On the fifth, fair-unfair, the only significant difference was between the full color page (mean=5.10) and the all black and white page (4.75). The difference, however, is slight and significant at a comparably low level (p=.012). Generally then, color did not affect how readers rated the paper on ethical factors.

There were also no significant differences between any pair on neat-messy and relaxed-tense, somewhat of a surprise.

There were weak differences on only a few of the page pairs--usually between the full color and one or more of the other pages--on four word pairs: important-unimportant, valuable-worthless, easy-difficult, and loud-soft. Leaving out the full color page in these calculations showed almost no significant differences. Thus, the use of one spot color, even a heavy use, may not change reader opinions in these areas, compared with a black and white page.

There were large and highly significant differences between nearly all page pairs on the nine remaining word-pairs. Most of these, however, are expected differences on stylistic or activity word-pairs on which color would naturally make a difference. The large differences here were reassuring from a validity standpoint.

On colorful-colorless, modern-old fashioned, active-passive, and fresh-stale, the differences were large, and in the direction expected. The remaining results, however, provide more interesting insights as to how readers perceive color in newspapers.

The full color page was seen as more interesting than the black and white page by a full two points (on a 7-point scale), an astounding difference on a scale that size. The spot color pages beat the B&W page by a full point, also a very large difference. Clearly, color interests readers.

The same basic story also was true on pleasant-unpleasant: color soundly whipped the B&W page. The B&W page also was a big loser to color use of any kind on exciting-dull, powerful-weak, and bold-timid.

A Thurstone scaling system was used to analyze the paired comparison tests. The percentage preferring each page was used to construct a score for each page on a 0-100 scale (Table 5). This system has been used successfully by Media General Research, which handled the data analysis for this portion of the study.

On this test, one word from a word pair from each of the five factor groups was selected and presented to the subjects one at a time. Considering each of the five words in turn, readers were presented with the 10 possible

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pairs of pages and asked to select one as having "more" of whatever word they were presented with.

For instance, using "Importance" as the evaluative word, subjects were presented with the 10 possible pairs of pages, each time being asked which of the two pages was "more important." The order of the words and of the page pairs was changed frequently.

In general, this method supported the results of the semantic differential test (Table 5). On "modern," as expected, the full color page was a big winner over all the pages, especially the black and white page. Also, on "loud," the same order of pages and large differences was found.

Interestingly, the spot red page was seen as being much "louder" than the spot blue page, something one would expect from "active" red and "passive" blue.

With "easy," the differences among the pages decreased. In other words, it became more difficult for the readers to choose one page over another based on appearance. The full color page was still seen as easiest, and spot blue was easier than spot red, and the black and white page was seen as the least easy.

The differences on the evaluative (important) and ethical (believable--a slight change from the word pairs) words, respectively, were even less. The full color page is still seen as most important, but the black and white page moved significantly higher. Spot blue was seen as slightly more important than spot red.

On "believable," the pages were rated very close together. Again, this means that, overall, subjects found it very difficult to choose one page as more believable than another based on color. For the first time, spot blue scored higher then full color (59 to 56), though the difference is not large enough to claim much more than a tie. Perhaps more interesting is that the spot red page fell below the page in all black and white with a red nameplate (51 to 45).

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In fact, comparing the two spot color pages--exactly alike except for the color--is intriguing. The spot red page was seen as "louder" (the obvious result) and more "modern." But the spot blue was found "easier," slightly more "important," and much more "believable." WHY this was so would be interesting to find out in a future study.

Few differences in response broken down by city or by any demographic variable were found. For instance, there was some tendency for educated subjects to react less favorably toward color (compared to black-and-white). But this happened so infrequently, and even somewhat inconsistently, that it would be difficult to attempt to make generalizations. Because the demographic variables made so few differences, however, it is probably safe to assume that a more representative sample would react in much the same way.

SUMMARY AND CONCLUSIONS

Although in most cases our subjects' eyes first fell on the main photo on the page (color or black and white), we found color to be a strong influence on eye movement. Color affects initial attraction to a page and where the eye moves from that point.

Despite the power of the main photo to attract, color on the page diminished that power. Color was sometimes more powerful than black-and-white photos in moving the eye after initial entry to the page. In some cases, a color tint block over type had enough attraction to move a reader past a secondary photograph. A gray screen over type does not seem to have the same pull as a color screen over type.

Color does not seem to affect greatly how readers feel about the ethical quality of a newspaper, nor does it strongly affect how important or valuable readers believe a newspaper is. Reassuringly, they seem to be unlikely to make assumptions about believeability or importance based on the appearance of the paper alone.

Color does make a paper appear more interesting, pleasant, exciting, and powerful. If these are considered positive attributes, then a publisher would do well to use color, providing the quality is good.

TABLE 1

DEMOGRAPHICS

SEX:	Male: 49%	
	Female: 51%	
AGE:	18 to 34: 34%	(national average is higher in this group)
	35 to 44: 20%	
	45 to 54: 13%	
	55 to 64: 13%	
	65 plus: 20%	(national average is lower)
RACE:	Caucasian: 66%	(national average is higher)
	Black: 22%	(national average is lower)
	Hispanic: 12%	(national average is much lower)
EDUCATION:	High school or less: 17%	
	Some college or tech school: 37%	
	College degree: 46%	(national average is higher)
INCOME:	Under $15,000: 25%	(national average is higher)
	$15,000-$25,000: 29%	
	$25,000-$35,000: 29%	
	Above $35,000: 17%	
MEDIA USE:	Read a paper at least 3 days per week: 95%	
	Read a paper at least 5 days per week: 78%	
COLOR PREFERENCE:	Blue: 61%	
	Red: 18%	
	Yellow: 8%	
	Green: 7%	
	Purple: 3%	
	Orange: 1%	

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TABLE 2

EYE MOVEMENT

(Adjusted percentage of page element selected most often for seen first, second, third)

Front pages

Page C	Top photo (53%), top story (26%), digest & TS (17%)
Page G	Top photo (54%), top story (27%), top story (18%)
Page S	Top photo (51%), top photo (26%), index (26%)
Page Y	Top photo (43%), top photo (19%), digest & index (21%)
Page K	Top photo (34%), top photo (30%), index (21%)

Feature fronts

Page B	Top photo (51%), Second photo (25%), second photo (27%)
Page E	Top photo (47%), Main head (19%), People box (28%)
Page F	Top photo (70%), Main head (29%), People box (30%)

Sports fronts

Page V	Top photo (40%), Top photo (29%), second photo (17%)
Page W	Top photo (24%), top photo (24%), digest (18%)
Page H	Top photo (64%), top photo & flag (19%), top story (18%)

LEGEND

Fronts: C=all black and white; G=B&W except spot blue nameplate; S=color halftones, blue spot color; Y=color halftones, multiple spot colors; K=B&W except color halftone in index.

Lifestyle: B=all black and white; E=B&W photo, hed and tint block in spot color; F=color halftone, hed and tint block in spot color.

Sports: V=all black and white; W=B&W photo, spot blue flag and promos, spot red and yellow info graphic; H=color halftone, spot blue flag and promos.

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TABLE 3

VISUAL MAGNETISM INDEX

Index is the sum of multiplying "seen first" adjusted percentage by 3, "seen second" by 2, and "seen third" by 1.

Front pages

Page C	Top photo	197	(all black and white)
	Top story	99	
	Promos	37	
Page G	Top photo	182	(all B&W except for blue nameplate)
	Top story	72	
	Digest	42	
Page S	Top photo	205	(color halftones, blue tint blocks)
	Index	107	
	Promos	43	
Page Y	Top photo	167	(color halftones, multiple color tint
	Index	57	blocks)
	Digest	51	
Page K	Top photo	162	(all B&W except for color halftone in
	Index	126	index)
	Top story	37	

Feature front

Page B	Top photo	201	(all black and white)
	Main head	136	
	Second photo	77	
Page E	Top photo	171	(B&W halftone, spot blue head, tint block)
	Main head	158	
	Second photo	67	
Page F	Top photo	240	(color halftone, spot blue head, tint block)
	Main head	112	
	Second photo	73	

Sports Fronts

Page V	Top photo	178	(all black and white, gray screen
	Top story	95	tint block on info graphic)
	Flag	75	
Page W	Top photo	120	(B&W halftone, blue flag and promos,
	Flag	89	red&yellow info graphic)
	Info graphic	75	
Page H	Top photo	230	(color halftone, blue flag and promos)
	Top story	51	
	Flag	46	
	(2nd photo)	45	

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TABLE 4

SEMANTIC DIFFERENTIALS

(A 1 to 7 scale was used. Figures are mean scores for each word pair. Word listed first was at low end of scale.

Word Pair	Page M	Page L	Page R	Page A	Page C
EVALUATIVE					
Unimportant/ Important	5.08	4.96	5.45	4.95	4.81
Worthless/ Valuable	4.71	4.51	4.88	4.74	4.41
Boring/ Interesting	4.61	4.71	5.71	4.34	3.73
Unpleasant/ Pleasant	4.88	4.85	5.46	4.46	4.02
ETHICAL					
Inaccurate/ Accurate	4.98	4.93	5.17	5.08	5.04
Irresponsible/ Responsible	5.04	5.22	5.23	5.16	4.96
Untruthful/ Truthful	5.06	5.06	5.07	5.00	5.11
Unfair/ Fair	4.96	4.93	5.10	4.98	4.75
Biased/ Unbiased	4.28	4.41	4.33	4.40	4.17
STYLISTIC					
Difficult/ Easy	4.55	4.89	5.08	4.44	4.25
Stale/ Fresh	4.69	4.76	5.61	4.23	3.83
Messy/ Neat	4.88	4.66	4.83	4.79	4.39
Colorless/ Colorful	4.43	4.66	6.48	3.53	2.35
Dull/ Exciting	4.51	4.29	5.58	3.92	3.37
POTENCY					
Soft/ Loud	3.81	3.82	5.52	3.69	3.58
Weak/ Powerful	4.53	4.47	5.37	4.23	3.85
Timid/ Bold	4.45	4.58	5.90	4.22	3.83
ACTIVITY					
Tense/ Relaxed	4.14	4.35	4.12	4.24	4.14
Passive/ Active	4.51	4.69	5.88	4.20	3.52
Old fashioned/ Modern	5.08	5.01	6.10	4.17	3.43
MEAN	4.66	4.69	5.34	4.44	4.08

LEGEND: L=B&W halftones, lots of spot blue; M=B&W halftones, lots of spot red; R=lead art is color info graphic, color halftone, multiple spot color; A=B&W except for spot red nameplate; C=all black and white.

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TABLE 5

PAIRED COMPARISONS

(percentage of subjects selecting the page when rating the pair on the listed word)

Pages	Important	Easy	Believable	Modern	Loud
A	70.9	72.2	67.1	83.5	88.6
C	29.1	27.8	32.9	16.5	11.4
A	36.7	26.6	39.2	14.1	38.0
L	63.3	73.4	60.8	85.9	62.0
A	36.7	27.8	49.4	7.6	10.1
M	63.3	72.2	50.6	92.4	89.9
A	32.9	24.1	43.0	5.1	11.4
R	67.1	75.9	57.0	94.9	88.6
C	25.3	12.7	30.4	5.1	12.7
L	74.7	87.3	69.6	94.9	87.3
C	32.9	21.5	45.6	10.1	8.9
M	67.1	78.5	54.4	89.9	91.1
C	34.2	24.1	41.8	5.1	7.6
R	65.8	75.9	58.2	94.9	92.4
L	60.3	57.0	68.4	46.2	17.7
M	39.7	43.0	31.6	53.8	82.3
L	36.7	32.9	46.8	8.9	7.6
R	63.3	67.1	53.2	91.1	92.4
M	29.1	29.1	39.2	12.7	13.9
R	70.9	70.9	60.8	87.3	86.1

Adjusted relative index (0 to 100 scale):

Important: R (64), L (57), M (51), A (47), C (35)
Easy: R (68), L (62), M (55), A (41), C (26)
Believable: L (59), R (56), A (51), M (45), C (40)
Modern: R (87), M (63), L (60), A (26), C (13)
Loud: R (85), M (69), L (44), A (37), C (15)

LEGEND

L=B&W halftones, lots of spot blue; M=B&W halftones, lots of spot red; R=lead art is color info graphic, color halftone, multiple spot color; A=B&W except for spot red nameplate; C=all black and white.

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